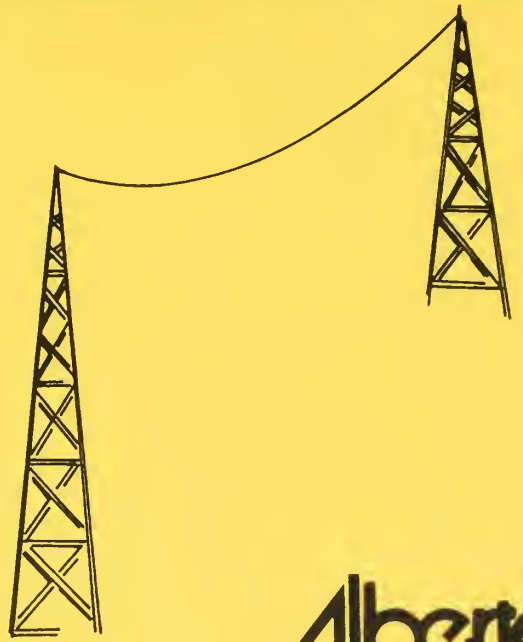
INDUSTRIAL EDUCATION

10-20-30 ELECTRICITY ELECTRONICS



Alberta

EDUCATION

1976

INDUSTRIAL EDUCATION

10, 20, 30

ALBERTA EDUCATION

1976

A C K N O W L E D G E M E N T S

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NOTE: This Curriculum Guide is a service publication only. The Senior High School Program of Studies contains the official statement concerning Senior High School Industrial Education. The information contained in the guide is prescriptive insofar as it duplicates that contained in the Program of Studies. There are in the guide, however, as well as content, methods of developing the concepts, suggestions for the use of teaching aids and lists of additional reference books.

NOTE:

Industrial Education 10, 20 and 30 is made up in four (4) packages according to career fields.

Teachers may select modules from a number of fields and consequently will need those packages that contain the content for the modules they plan to teach.

The packages are color-coded and contain the following career fields:

A. Electricity-Electronics - yellow
B. Materials - green
C. Power Technology - blue
D. Visual Communications - orange
E. The general modules of Research, Development and Production Science will be found in each package.

Study the content of the modules carefully and select those that best meet the needs of the students in the school, your own competencies and the availability of tools and equipment.

TABLE OF CONTENTS

A. ELECTRICITY - ELECTRONICS

MODULES

A. ELECTRICITY - ELECTRONICS

INTRODUCTION

Energy in the form of electricity has become very important. Power and energy are generally considered to be one and the same thing, and power is basic to our standard of living. With the concern for the efficient utilization of energy, the study of electrical technology takes on increased significance.

These are twelve one-credit modules of content which provide the students and teacher considerable choice in building the type of program best suited to the situation. The content is exploratory in nature with an emphasis on the concept generalization format.

The concepts given priority in electrical technology are:

1. Energy Conversion
2. Energy Control
3. Energy Transfer
4. Energy Utilization.

In addition, the eight concepts common to the total program and incorporated in every module where appropriate are:

1. Consumer Awareness

   - quality
   - affective advertising
   - specifications
   - dollar value
   - buying procedures
   - availability
   - parts
   - serving

2. Environmental Implications

   - time element (past, present, future)
   - rates of consumption
   - conservation
   - alternatives
   - pollution (land, air, water)

3. Graphic Interpretation

   - schematic
   - symbols
   - drawing interpretation
   - visuals
   - technical drawing and interpretation

4. Measurement

- British Engineering System (present English systems)
- System Internationale (SI)
- accuracy
- tools and instruments
- tolerances
- precision
- estimating
- approximating
- computations (including graphs, charts, interpolation)

5. Career Information

- benefits
- unionism
- local opportunities
- job mobility (vertical, horizontal, geographic)
- future
- retraining and upgrading
- jobs vs. careers

6. Societal Implications

- time (past, present, future)
- economic
- life patterns
- status
- values and mores

7. Technological Implications

- costs, benefits, consequences (C.B.C.)
- resource use and abuse
- tool development and use
- manufacturing
- servicing
- obsolescence
- design process
- planning

8. Safety

- unsafe conditions
- unsafe acts.

The modules as listed may be selected in the order that the teacher finds most appealing. The modules taught for a total of 65 hours will serve as a prerequisite for the appropriate 22 courses in Electricity or Electronics.

The systems approach, beginning with the system and progressing through blocks, components and principles,is a useful method of developing an analytical approach to problem solving. It is hoped that every action - past, present and future - will be examined in terms of its costs, benefits and consequences (C.B.C.).

The modules as listed may be selected in any order or combined to make a cluster related to a career area. It might be preferable to start with the first two modules in Electricity and Electronics and then proceed with any of the others.

I. OBJECTIVES

The objectives of the modules in Electrical Technology are:

1. To make the student aware of a number of ways to convert energy forms and to use various methods of transferring and controlling the converted energy to an intended use.

2. To give the student an opportunity to practice troubleshooting techniques, utilizing analytical thinking.

II. REFERENCES

These are listed under each module.

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

If at all possible a working model "constructed" by the student would make the content of the module more meaningful. This may not be possible in all cases such as in the television module.

I. INTRODUCTION

The Industrial Education 10, 20, 30 series of courses is designed to provide exploration of, and orientation to, a wide variety of career options. These courses provide guidance to students to help them select more in-depth courses for occupational preparation or simply add to their technological "know-how".

Through the program, students are able to work in an environment which is conducive to challenging their intellect and developing their talents in a number of technical and craft areas. Students become aware of the interrelationship and the dependency of one technology upon the others. They have the opportunity to develop an understanding of the principles and skills required in the various occupations. Students will have many opportunities to apply academic skills learned in other subjects to their lab work.

II. PHILOSOPHY

Industrial Education adds a new dimension to the program for educating young people at the secondary school level. For many students it will open new options to help prepare them for the life ahead while enjoying their studies now. The authors of the Industrial Education curriculum recognize that the needs of society have changed, and with them the approach to knowledge acquirement. Students today must be helped to learn how to learn, to conduct inquiry, to study independently, to make choices and decisions, to use technology, and to live with change.

The Industrial Education program is concerned with career development. Because careers today do not develop along predictable lines, our education program must provide considerable flexibility so that students have an option of several career choices. This is possible for several reasons. A person who has been broadly educated is able to learn what he needs to know, within limitations, about a new job. With the general education level of society rising, the future worker needs broad as well as experience-based education. Such an education offers him subsequent chances for rapid and successful specialization. With this in mind the learning experiences should be such that they become the basis upon which specialization can be built.

Our task in the secondary school then, is to provide students not only with entry skills for several careers but to orient the program to meet social and cultural goals. This means that the various courses or disciplines must be interrelated. Industrial Education provides a unique opportunity for the teacher to demonstrate these relationships and further, to capitalize on them by means of the motivation created through practical applications.

Thus the experiences to which students are exposed should provide them with realistic criteria for career guidance.

Industrial Education is a program consisting of courses that provide a continuum of experiences, starting with exploratory experiences and activities in the elementary and junior high school, expanding in the high school to the development of skills in career fields and culminating in on-the-job experience.

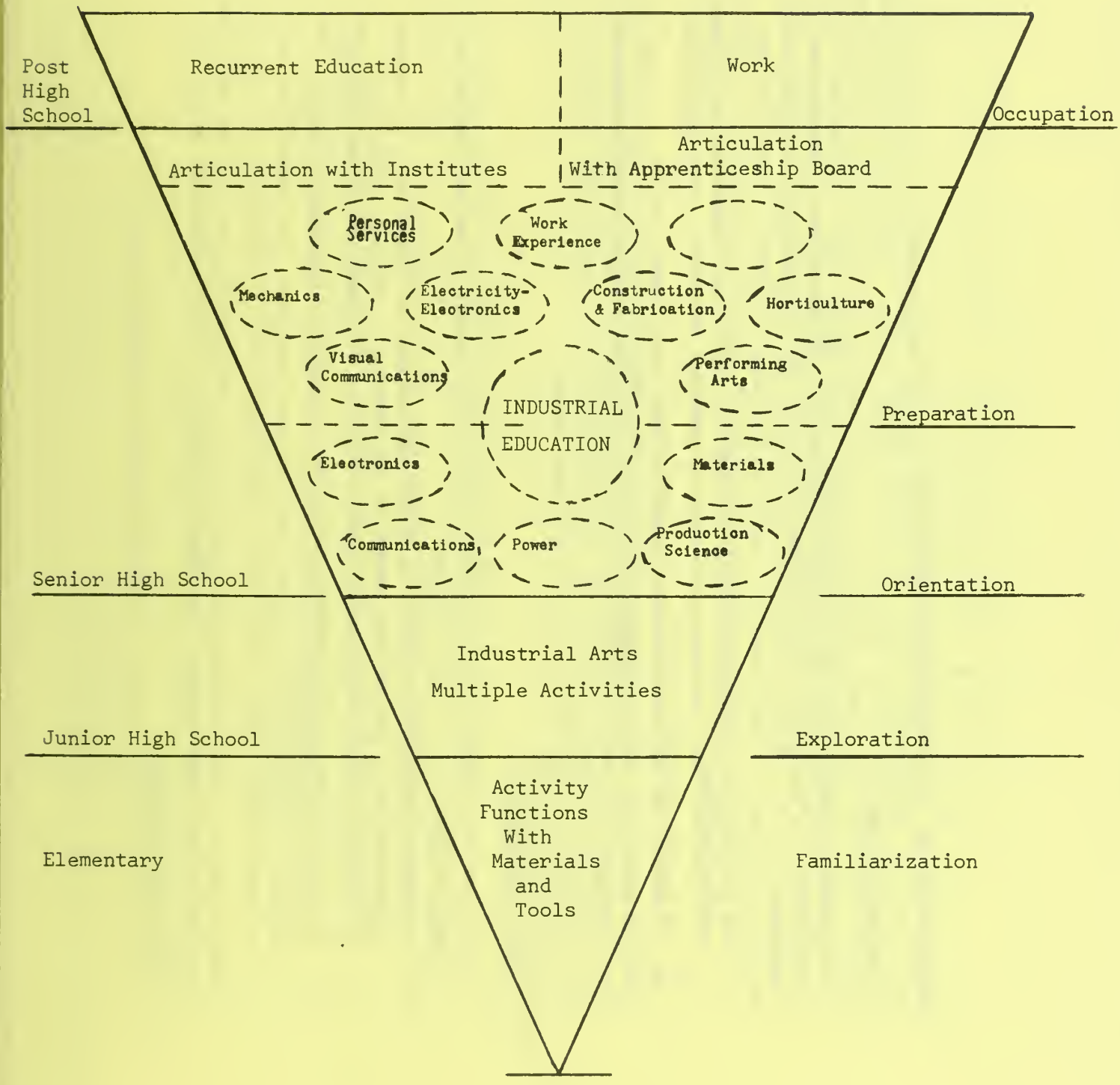
Industrial Arts, the exploratory phase of the continuum, provides the opportunity for the students to explore, reason, experiment and discover the reality of the technological society in which they live. The content of the program deals with industry, its organization, materials, processes, products, occupations, and the problems resulting from the impact of technology on society.

Following the exploratory phase, students may begin orientation studies in a career field. They may select modules of a more general nature in the Industrial Education 10, 20, 30 series or alternately take an introductory 12 course related directly to a career field. From here they advance to the more specific courses in the Industrial Education 22-32 program which prepare them for a career. The chart on page 3 illustrates the Industrial Education Program in conceptual form, showing the advancement of a student from the awareness or familiarization stage to exploration, orientation, preparation and finally, an occupation. These courses provide in-depth experiences in the development of skills in tool and machine operation, material processes, drawing and interpretation and a knowledge of the basic concepts related to the technologies. All the courses place emphasis on practical work and applied theory.

ALBERTA INDUSTRIAL EDUCATION PROGRAM

FOR

CAREER CHOICE AND DEVELOPMENT



Legend: ——— Solid line indicates levels.

------- Broken lines and open spaces indicate opportunity to transfer to other options.

III. OBJECTIVES

The objectives of Industrial Education 10, 20, 30 are as follows:

A. Personal Growth

To provide opportunities for the individual growth of the student through the development of acceptable personal and social values necessary in a productive society.

1. To provide a technical environment which motivates and stimulates individuals to discover their interests and develop personal and social responsibilities.
2. To assist in the development of positive attitudes toward safety.
3. To assist in the development of positive attitudes towards conservation and ecology.
4. To assist in the development of consumer values.

B. Career Exploration

To provide the student with experiences which will assist in making realistic career choices.

1. To provide students within a technical environment an opportunity to become acquainted with the skills, technical requirements, working conditions, responsibilities, opportunities and rewards in a variety of career fields.
2. To relate their own interests, abilities, likes, dislikes and values to several career fields.

C. Occupational Skills

To develop basic competencies, integrating cognitive and psychomotor skills to enter a family of occupations or post-secondary institutions for further education.

1. To provide exploratory experiences in the use of tools, equipment and materials appropriate to various technologies prevalent in a productive society.
2. To develop an understanding of the interrelationships of various technologies.
3. To provide a technical environment for students to synthesize their accumulated knowledge in the solution of practical problems.
4. To assist the student to develop habits that will be conducive to the establishment of a safe environment.

IV. ORGANIZATION

A. Program Organization

The Industrial Education 10, 20, 30 courses consist of 55 one-credit modules of content. The modules are categorized into career fields. Four career fields, i.e. Graphic Communications, Electricity-Electronics, Materials and Power Technology have the content of the modules outlined in this guide.

1. Regular Program

Courses may be made up by arranging combinations of modules drawn from the fifty-five available modules. These should be selected carefully to meet the needs of the students while at the same time providing appropriate consideration to factors such as suitability of facilities, equipment availability, supply costs and teacher experience or training. Each course may be taught for 4 or 5 credits (100 - 125 hours). The content for each module may range from 25 - 33 hours. Four modules of 33 hours each would provide the necessary time for a five-credit course. Four 25-hour modules would meet the time requirements for a four-credit course. The selection and sequence of modules is left to the teacher's discretion.

Procedurally, students will register in a course made up of four modules. The first four modules taken by a student would normally be registered as Industrial Education 10A. The next four modules would become 20A and the third set of four modules would be 30A. If some students wished to enrol in further Industrial Education courses, the next course would become 10B, with 20B and 30B following. It would be possible for students to arrange different sequences of courses if it is thought advisable. For example, one sequence might be 10A, 10B, 20A, 20B, 30A, 30B; another might be 10A, 20A, 30A, 10B, etc. Sequencing of courses will be left to local authorities. Examples of courses are as follows:

IE 10A (4-5 credits)	IE 20A (4-5 credits)	IE 30A (5 credits)
IE 10B (4-5 credits)	IE 30A (4-5 credits)	IE 30B (5 credits)

2. Special Consideration

In schools where vocational courses are taught, teachers have the option of using content from the "12" courses to make up the 65 hours required as prerequisite to the "22" courses. That is, in a composite high school where unit shops are available, students could be scheduled into two shops for a total of 125 hours, e.g. Auto and Welding. They could then advance to a "22" course in either or both of the two.

Students in the Industrial Education 10 program would be required to take two modules for 33 hours each, directly related to the "22" course for which they are earning the prerequisite. For example, a student would have entry to a "22" program by taking two closely related units, plus two others:

e.g.	Basic Woods (33 hrs.)	66 hrs. permit entry to
	Building Construction (33 hrs.)	Building Construction 22
	Architectural Drawing (33 hrs.)	
	Basic Wiring (33 hrs.)	
Approximate Total	132 hrs. = 1 Industrial Education course (5 credits)	

B. Guide Organization

The course guide is organized on the following pattern:

1. Career Field

All the modules are classified in four career fields:

Graphic Arts
Electricity-Electronics
Materials
Power.

2. Module Topic

Each module will be identified by a topic title.

3. Generalization

The first column describes the generalization or "big idea" that students should learn. A generalization expresses a relationship between two or more concepts. It is a statement of fact which is true in more than one situation.

4. Technical and common concepts divide the topic into categories of information that are reduced to single ideas. The technical concepts are specifically related to the topic. The common concepts used in the context of this guide are concepts that have relevance for all the topics.

5. Learning Tasks

The learning tasks column describes what activities students are expected to engage in.

6. Behavioural Objectives

These describe specific changes in student behaviour which result from the learning tasks performed.

An objective is a statement describing the intended outcome for the learner. Three kinds of instructional objectives are used:

- The cognitive objectives are those concerned with knowledge. They are characterized by such terms as "identify, differentiate, analyze".

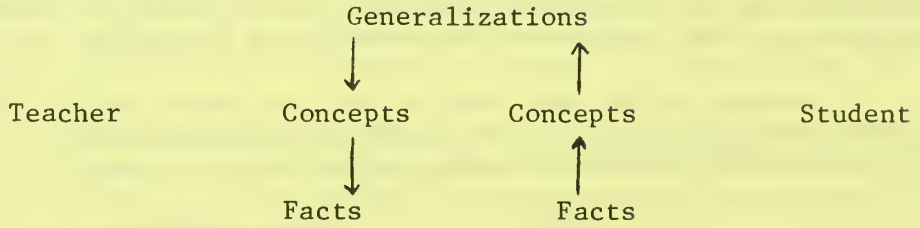
- The affective objectives are those concerned with feeling. Such terms as "awareness" and "value" illustrate the affective objective.

- The psychomotor objectives are those concerned with skills and applied knowledge. They are expressed by the terms "develop skills in", and "extend skills".

The guide gives only a few sample behavioural objectives. It is the responsibility of the teacher to develop as many behavioural objectives as he/she can teach in the time available.

Facts are taken to be items of specific information, concepts are categories of information and generalizations express the relationship between concepts.

In planning a lesson, the teacher moves down this hierarchy, whereas in learning, the student begins with the facts and moves upward.



C. Facility Organization

The organization of the physical facilities is in part determined by the original plan. There are, however, adjustments that can be made in the layout by the teacher to accommodate his/her style of teaching. The number of students in a class affects the way the lab or shop is organized. While most of the shops in Alberta are designed for 16 to 20 students,a number of factors must be considered in the final assignment of class load. These factors include:

1. physical size of the shop or laboratory
2. type of student
3. amount of equipment
4. type of programming
5. type of course
6. training and experience of the teacher.

Safety of the students and their opportunity to obtain teacher contact are important considerations when class loads are determined.

V. E V A L U A T I O N

Evaluation of student growth should be based on stated behavioural changes and specific criteria understood by the students. Allowance should be made for both self and teacher evaluation and, in some cases, peer evaluation. Evaluation should be based on the three domains of learning as defined by an Alberta committee of Industrial Education teachers. These categories are as follows:

1. Verbal and Written Communication

2. Personal Growth

3. Manipulative Skills.

The weighting given each of the three measures will depend on the nature of the behaviour being evaluated. For a more detailed treatment of evaluation see the Industrial Education Handbook (Alberta Education, 1976).

V I. C O N T E N T

The following are the titles of modules in the Industrial Education 10, 20, 30 course.

A. Electricity-Electronics (yellow package)

1. Electricity
2. Electronics
3. Power Supplies
4. Amplifiers
5. Audio
6. Servicing
7. Radio
8. Television
9. Logic Circuits
10. Computer
11. Electric Wiring
12. Design and Construction

B. Materials (green package)

1. General Woods
2. Building Construction 1
3. Building Construction 2
4. Cabinet Construction 1
5. Cabinet Construction 2
6. General Metals
7. Sheet Metal
8. Machine Shop
9. Arc Welding
10. Oxy-Acetylene Welding
11. Foundry
12. Plastics 1
13. Plastics 2
14. Earths - Ceramics
15. Earths - Concrete
16. Textiles
17. Foods

C. Power Technology (blue package)

1. Conventional Heat Engines
2. Small Engine Tune-Up and Trouble Shooting
3. Small Engine Overhaul
4. Automobile Care
5. Automobile Tune-Up
6. Mechanical Systems
7. Electro Mechanical Controls and Circuit Trouble Shooting
8. Electrical Systems
9. Non-Conventional Power Sources
10. Appliance Repairs and Trouble Shooting
11. Hydraulics and Fluidics
12. Pneumatics and Fluidics

D. Visual Communications (orange package)

1. Principals of Offset Lithography
2. Line Photography
3. Black and White Photography
4. Color Photography
5. Screened Photography
6. Layout and Design
7. Offset and Printing Production
8. Mechanical Drafting
9. Topographical Drafting
10. Architectual Drafting
11. Relief Printing
12. Print-Making Techniques

E. General

Three modules of a general nature also are available. These are:

1. Research module
2. Developmental module
3. Production Science module.

ELECTRICITY - ELECTRONICS

ELECTRICITY

MODULE ONE

MODULE ONE

ELECTRICITY

INTRODUCTION

Energy is basic to our industrial society. This module gives students an introduction to basic forms of energy, its conversion to useful work, control transmission and utilization. Electrical theory is studied as necessary for the understanding of the concepts referred to.

I. OBJECTIVES

The objective of this module is to introduce the student to the theory and its application to the control of the subtle power of electricity.

II. REFERENCES

1. Buban, Peter & Marshall L. Schmitt UNDERSTANDING ELECTRICITY AND ELECTRONICS. McGraw-Hill, 1975.
2. Lion, Kurt S. ELEMENTS OF ELECTRICAL AND ELECTRONIC INSTRUMENTS. McGraw-Hill, 1975.
3. Middleton & Goldstein. BASIC ELECTRICITY FOR ELECTRONICS. Holt-Rinehart, 1966.
4. Shick. PRINCIPLES OF ELECTRICAL THEORY. McGraw-Hill, 1967.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. Any form of energy can be converted into another form.	1. Energy Conversion	The student will learn:	The student will:
		a. about various converters of energy -units of energy -characteristics of energy -forms of energy.	a. define the terms potential and kinetic energy and give examples of them in everyday life.
		b. how to use measuring instruments - VOM/VTVM -oscilloscope -power supply.	b. generate electricity by various means -radiant -mechanical -chemical, and note and record their characteristics.
		c. about types of energy - A.C. - D.C.	c. measure within limits of accuracy recognized in the field -resistance -voltage -amperage using appropriate measuring instruments.
		d. about units of electricity - volt - ampere - ohm - watt.	
2. There is potential danger inherent in electrical devices and their applications.	2. Safety a. unsafe acts b. unsafe conditions.	a. how to identify unsafe acts. b. how to identify unsafe conditions.	a. analyze and list unsafe conditions in his work area. b. not perform a trial and error method of inquiry.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
3. Energy must be controlled to make it more useful.	3. Energy Control	The student will learn:	The student will:
	a. Graphic Interpretation -schematics -symbols	a. how to read schematics and know the meaning of symbols.	a. given a schematic construct experiment using two terminal devices in A.C. and D.C., identify the characteristics of the devices.
	b. Devices -Z-terminal (resistors, capacitors, inductors, diodes) -rating/limitation	b. identify various devices and explain their function and limitations.	b. given a schematic and devices, predict their limitations through calculations from available specifications.
	c. Terminations -solder -nonsolder	c. how to solder	c. correctly terminate electrical devices using solder and nonsolder devices.
4. Energy can pass through different mediums.	4. Energy Transmission a. Circuitry -series -parallel -complex	a. different types of circuits and how they function.	a. construct two different basic circuits using two similar or dissimilar terminal devices, record data and then prove the laws applying to the circuit by calculation using the data recorded.
5. Careful utilization of energy is important to achieve maximum efficiency.	5. Energy Utilization -cost -benefit -consequences.	a. that conservation of energy is important to his long-term well being.	a. write an essay on how he personally could reduce energy consumption.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
6. Schools must help prepare students to make realistic occupational choices.	6. Occupations	The student will learn: a. how to search out occupational information.	The student will: a. use the Canadian Classification and Dictionary of Occupations (CCDO) to prepare a report on one occupation of personal interest.
7. Technology has placed our environment in a precarious position.	7. Technological Implications	a. about the interrelationships of industry and technology. b. about the availability of materials and resources. c. about the problem of obsolescence.	a. demonstrate a mature view of the implications of waste by the way he conducts himself and his selection of a life style.

* Common concepts in *script*. These are concepts common to most units.

ELECTRICITY - ELECTRONICS

ELECTRONICS

MODULE TWO

MODULE TWO

ELECTRONICS

INTRODUCTION

Through the activities of this module the student will be able to learn the mystery of electronics using actual test instruments and electrical devices.

I. OBJECTIVES

The objectives of this module in electronics are to:

1. Help students unravel the mystery of electronics,

2. Help students learn to correctly use test instruments.

II. REFERENCES

Buban, Peter & Marshall Schmitt. TECHNICAL ELECTRICITY AND ELECTRONICS. McGraw-Hill, 1972.
Dugger, W. et al. BASIC ELECTRONIC SYSTEMS TECHNOLOGY, 8 UNITS. Bruce Pub.Co., 1973.
Markus, John. ELECTRONICS CIRCUIT MANUAL. McGraw-Hill, 1973.
Markus, John. GUIDEBOOK OF ELECTRICAL CIRCUITS. McGraw-Hill, 1973.
Markus, John. SOURCEBOOK OF ELECTRONIC CIRCUITS. McGraw-Hill, 1973.
Weick, C. B. APPLIED ELECTRONIC CIRCUITS. McGraw-Hill, 1972.
Weick, C. B. PRINCIPLES OF ELECTRONIC TECHNOLOGY. McGraw-Hill, 1969.
Texas Instruments Learning Centre. UNDERSTANDING SOLID-STATE. Radio Shack.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is potential danger inherent in handling electronics devices.	1. *Safety* - unsafe acts - unsafe conditions.	The student will learn: a. how to assess a situation for unsafe conditions.	The student will: a. perform all assignments in a planned and organized manner.
2. Any form of energy can be converted.	2. Energy Converters and transmission	a. about electronics phenomena like -electron emission -electron charges -electron fields -electron potential -electron theory -energy conversion.	a. given resource materials and equipment set up experiments to illustrate at least two of the electronic phenomena.
3. Accurate measurement is necessary in electronics.	3. Measurements -units of electricity -prefixes -color codes -test Instruments -VOM/VTVM -oscilloscope -AF/RF Generators -tube/Transistor Tester -power Supplier -curve/Signal Tracer.	a. the units of measurment commonly used. b. the color code. c. how to use the various test instruments correctly and accurately.	a. given instruments and devices set up a circuit and measure accurately: resistance, voltage and amperage. b. construct two different circuits using two terminal devices Collect data on the characteristics. Use the data to calculate to prove the respective laws.
4. Energy must be controlled to make it more useful.	4. Energy Control a. graphic interpretation. b. devices -2-terminal -3-terminal -I.C.'s	a. how to read schematics, use reference materials and understand the symbols used.	a. construct two different 3-terminal devices and using test instruments show their control of electrons. b. use instruments to test tubes and semiconductors. c. crossreference and locate the pertinent data on three different semiconductors.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
5. Energy can pass through many mediums.	5. Energy Transmission: a. Circuitry -series -parallel -complex. b. Terminations -electrical -mechanical -electrical/ mechanical.	The student will learn: a. how to calculate values in the various circuits.	The student will: a. solder properly two heat sensitive devices on a printed circuit board.
6. Technology has endangered the continuation of our society.	6. Societal Implications		a. forecast the future of electronics in one of;industry, medicine, military education or domestic segment of society.

ELECTRICITY - ELECTRONICS

POWER SUPPLIES

MODULE THREE

MODULE THREE

POWER SUPPLIES

INTRODUCTION

Students will learn how a power supply functions by building one to convert A.C. to D.C.

I. OBJECTIVES

The objectives of this module are to help students:

1. Understand how electricity is generated and converted
2. Become acquainted with the use of measuring instruments
3. Construct a power supply

II. REFERENCES

1. Buban, Peter & Marshall L., Schmitt. TECHNICAL ELECTRICITY AND ELECTRONICS. 1st. Ed. McGraw Hill, 1972.

2. Weick, Carl B. APPLIED ELECTRONIC CIRCUITS. First Edition. McGraw-Hill, 1972.

3. Dugger, Dale; Alan Suess: James Ziegler. BASIC ELECTRONIC SYSTEMS TECHNOLOGY 2nd. Ed. Bruce, 1973.

III. SAFETY

The teacher should make the student aware of good electrical-mechanical connections, the importance of the use of proper rated components, correct use of protective devices and general laboratory safety procedures.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is a potential danger inherent in electrical devices and their application	1. Safety a. unsafe acts	The student will learn a. how to identify unsafe acts and conditions in the electrical trade	The student will: a. use correct procedure instruments to circuits.
	b. unsafe conditions	b. the difference between trial and error and planned inquiry	b. given examples , identify unsafe acts an or conditions. c. given an assignment , perform a planned inquiry using analytical thinking.
2. Any form of energy can be converted into another form.	2. Energy Conversion a. atomic theory and kinds of energy - radiant - mechanical - chemical	a. about the atomic theory of matter.	a. outline and identify how electricity is generated from each of the listed energ sources, select one source and set up experiment to generate electricity.
		b. how energy is converted	
3. Instruments and measurements help us confirm our predictions.	3. Measurement a. voltage	a. to use instruments to measure the various units or form.	a. Measure with appropriate measuring instruments, known and unknown i. voltage -P -P. Peak ., R.M.S. -D. C. ii. amperages - P- P, tech., R.M.S. - D. C. iii. resistances iv. waveforms .
	b. amperage		

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
		The student will learn:	The student will:
	c. resistance d. waveforms.		
4. Communication by symbols can be universal if the symbols are standardized	4. Graphic Interpretation	a. to read schematics and understand symbols.	
5. Our society has become very dependent on electricity; consequently a continuing source is necessary to maintain our standard of life.	5. Environmental Implications	a. the relationship between costs, benefits, and consequences	a. state the pros and cons of the three electrical energy sources: radiant, mechanical, chemical
6. Energy must be controlled to make it more useful.	6. Control a. transformer	a. how the various control devices function and the purpose of each.	a. build a power supply.
	b. rectifiers		b. compute the step-up and step-down ratio of a power transformer
	c. capacitors		c. connect and observe the line voltage with a meter to confirm compretation of xbl.
	d. inductors		d. connect and observe the 1/2 and full-wave rectification using a meter and oscilloscope.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
		Students will learn:	The student will:
	e. resistors.		e. record and interpret the various wave rectification using a meter and oscilloscope.
7. Energy can pass through different mediums.	7. Transmission a. conductors b. induction.	a. about carrying capacity of various conductors. b. the principles behind induction and how they are used for practical purposes. c. <u>If time permits</u> study -voltage regulations -current limiters -voltage dividers -variable power supplies -battery charges	a. rate the constructed power supply, notin its limitations. b. analyze the power supply using a block diagram.

* Common concepts in *script*. These are concepts common to most units.

ELECTRICITY - ELECTRONICS

AMPLIFIERS

MODULE FOUR

MODULE FOUR

AMPLIFIERS

INTRODUCTION

This module will provide students the opportunity to learn the theory of amplification while they build an amplifier.

I. OBJECTIVES

The objective of this module is to:

1. Teach students the theory of amplification
2. Give students a chance to practice using electrical test equipment
3. Give students the opportunity to build an amplifier.

II. REFERENCES

1. Weick, Carl B. PRINCIPLES OF ELCTRONIC TECHNOLOGY. First Edition. McGraw - Hill, 1969.

2. Texas Instruments Learning Centre. UNDERSTANDING SOLID STATE. Radio Shack .

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. Energy cannot be created or destroyed.	1. Energy Conversion *Measurement	The student will learn: a. the operations of -V.T.V.M. -V.O.M. -AF + RF signal generation -power supply -oscilloscope -curve tracer -frequency counter -transistor checker b. the difference between A.C. and D.C.	The student will: a. use the instruments with a reasonable degree of proficiency. b. given a transistor, reference material and measuring instruments, predict its limitations. c. list the conditions necessary for amplification. d. given a transistor , construct one of the three amplifier classifications. e. record and calculate the data from this functional and terminal amplifier.
2. Small amounts of energy can be used to control large amounts.	2. Energy Control	a. schematic drawings b. component identification.	a. given the materials and instructions, construct a functional oscillator. b. given the materials and instructions, construct a functional amplifier and note its limitations

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
		The students will learn:	The student will:
		c. basic amplifier configuration.	c. analyze the pertinent specifications of a manufactured amplifier.
3. Electrons pass through different mediums.	3. Transmission of Energy - electron theory.	a. the electron theory.	
	4. Graphic Interpretation	a. how to read symbols and diagrams.	a. interpret the information from a schemat as required in the construction of an amplifier.
		b. about the electronic components and how to identify them.	
		c. the functions of a 3 - terminal device.	

ELECTRICITY - ELECTRONICS

AUDIO

MODULE FIVE

MODULE FIVE

AUDIO

INTRODUCTION

This module introduces the students to audio systems and should provide enough information to make them knowledgeable consumers.

I. OBJECTIVES

The objectives of this module are to:

I. Provide the student with experience in using measuring instruments

2. Help the student become well informed on audio systems.

II. REFERENCES

1. Buban, Peter & Marshall L. Schmitt. TECHNICAL ELECTRICITY ELECTRONICS McGraw-Hill, I972.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. The phenomena of sound can be observed using electronic equipment.	1. Measurement	The student will learn: a. the operation of equipment to record data related to audio - V.T.V.M. - V.O.M. - oscilloscope - power supply - A.F. and R. F. signal generator - signal tracer.	The student will: a. measure the input and output of an audio system and record and analyze the data. b. using the measuring instruments, follow the audio signal from all the inputs and outputs. c. describe the conversion stages in the system.
2. Audio signals can pass through many mediums	2. Transmission	a. the units, nature and terminology of sound.	a. differentiate between direct and indirect sounds.
3. Audio signals are easily converted.	3. Energy Conversion	a. audio input and output transducers	a. analyze the major input and output transducers of two recording and playback audio systems - limitations - fidelity.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
4. Sound can easily be distorted.	4. Control	The student will learn: a. conditions of amplification distortions - pre-amplifiers - power amplifiers - coupling - filtering.	The student will: a. given technical information about an audio system, interpret the data.
5. Appreciation of sound varies among individuals.	5. Utilization	a. interpreting the specifications of transducers and amplifiers.	
	6. Consumer Awareness	a. things to watch for when buying audio products.	a. analyze the specifications of systems and make a judgement as to the best buy on a cost, benefit and consequences formula.

ELECTRICITY - ELECTRONICS

SERVICING

MODULE SIX

MODULE SIX

SERVICING

INTRODUCTION

Servicing and trouble shooting are closely associated but the trade differentiates between the two. Trouble shooting is the use of various instruments in a logical sequence to determine what is wrong with an apparatus. Servicing requires the determination of the fault and then repairing or replacing the defective parts. The process involves disassembly, replacement or repair, reassembly and testing.

I. OBJECTIVES

The objectives of this module are to:

1. Give the students practice in trouble shooting procedures,
2. Give students practice in servicing some electronic equipment.

II. REFERENCES

1. Tepper, Marvin. BASIC RADIO REPAIR. Volume 1 & 2 Rider Publication, 1963.

2. Wheeler, Gershon J. HOW TO REPAIR ELECTRICAL APPLIANCES. Reston Publication, 1972.

3. Douglas - Young. COMPLETE GUIDE TO READING SCHEMATIC DIAGRAMS. Parker Publisher, 1972.

4. Sands. 161 QUESTIONS AND ANSWERS ABOUT TRANSISTORS. Howard Sons, 1970.

5. **Risse**, Joseph A. UNDERSTANDING ELECTRONIC TEST EQUIPMENT. Howard Sons, 1968.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. All electrical systems (appliances) can be broken into basic electrical circuits.	1. Systems Analysis	The student will learn: a. how to identify the components of 4 circuits	The student will: a. draw a basic electrical circuit and identify the - source - fusing - control - load - conductor medium. b. correctly use the electrical symbols in the drawing. c. given an electrical/electronic system and using a block diagram, analyze the circuit and record the major and minor inputs and outputs. d. given test instruments, measure the major inputs and outputs of an electrical/electronic system. e. record all pertinent data for diagnosis. f. locate the trouble in a system within a minor input or output component block.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
2. Electrical systems are primarily energy converters.	2. Energy Conversion and Transmission *Graphic Interpretation	The students will learn; a. about the common types of converters and how electricity flows. b. about the visual and hidden troubles found in appliances. c. to read and trace circuits	The students will: a. given the equipment, parts and instructio build a basic electrical circuit and explain how it functions. b. use a continuity checker and understand it limitations c. draw a block diagram listing the major and minor inputs and outputs. d. read the specifications and test the defective system to isolate defect.
3. Instruments are a means of determining what is happening in a circuit.	3. Instrument Utilization	a. how to use test instruments safely and accurately. b. how to evaluate a defective appliance in terms of whether it is worth fixing.	a. accurately use the V.O.M. and the oscilloscope to make diagnostic tests. b. record and analyze all pertinent and measured data. c. disassemble and assemble a defective devic using proper tools to repair the defective parts. d. show the quality control of the repaired item to keep it performing according to its rating.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
4. Finding data and conversion charts is an important skill for electronic repairmen.	4. Information Retrieval	The student will learn a. how to use reference safeware.	The student will: a. use catalogues and component references with competence.
5. Schools must help students make realistic career choices.	5. Occupations	a. use the Canadian Classification and dictionary of Occupations to find job descriptions.	a. list several occupations in the electricit electronics field that are of personal interest and then develop a file including educational requirements, where this can be fulfilled, job opportunities and economic considerations.

* Common concepts in *script*. These are concepts common to most units.

ELECTRICITY - ELECTRONICS

RADIO

MODULE SEVEN

MODULE SEVEN

RADIO

INTRODUCTION

Understanding the basic circuitry of a radio is both interesting and of practical value. Students will become familiar with the radio as a system.

I. OBJECTIVES

The objectives of this module in radio are to:

1. Give the students the opportunity to become familiar with the components and circuitry making up the radio system,

2. Give the students actual practise in the diagnosis of radio circuits.

II. REFERENCES

1. Buban, Peter & Marshall Schmitt. TECHNICAL ELECTRICITY AND ELECTRONICS. McGraw Hill, 1972.

2. Middleton, Robert. AM - FM - TV ALIGNMENT. Howard Sons, 1970.

3. Tepper, Marvin. BASIC RADIO REPAIR. Volumes 1 & 2. Rider, General Publishing, 1963.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is potential shock danger in any electrical appliance	1. Safety -unsafe acts -unsafe conditions	The student will learn: a. conditions to watch for when working on radios. b. correct procedures for using instruments.	The student will: a. not attempt the trial and error method of inquiry.
2. Energy must be controlled to make it more useful.	2. Energy Control - the radio system.	a. the meaning of -receiver -transmitter. b. how to make a block diagram of a radio. c. the difference between A.M., F.M. and short wave. d. the meaning of response curve, tuning and LCR circuits. e. about the operation characteristics of receivers and transmitters.	a. draw a block diagram of a radio system and explain the function of each block. b. explain the difference between a T.R.F. and a superheterodyne receiver. c. construct an operational radio receiver.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
3. Instruments to make accurate measurments are essential in electronics.	3. Measurement	The student will learn: a. to use the following instruments - oscilloscope - meters - tracers - generators.	The student will: a. using an oscilloscope, a schematic drawing and a block diagram, identify each block in a working receiver.
4. Any form of energy can be converted into another form.	4. Energy Conversion	a. about transducers and modulation in A.M. and F.M.	a. using appropriate instruments, heterodyne and modulate signals. b. tune a radio to operate at its maximum characteristics. - sensitivity - fidelity - selectivity.
5. Energy can pass through different mediums.	5. Energy Transmission	a. how radio waves are transmitted. b. how to identify components by symbols used on schematics . c. about resonance.	a. prepare a precis on the importance of radio to our society.

* Common concepts in *script*. These are concepts common to most units.

ELECTRICITY - ELECTRONICS

TELEVISION

MODULE EIGHT

MODULE EIGHT

TELEVISION

INTRODUCTION

The television set is a device common to most homes. This course provides students with an understanding of the electronic circuitry applied in the television system.

I. OBJECTIVES

The objectives of this module in television are to:

1. Give the students the opportunity to become aware of the circuitry making up the television system,

2. Give the students practise in the diagnosis of the television system(s).

II. REFERENCES

1. Grob. BASIC TELEVISION. Third Edition. McGraw Hill.

2. Marcus, and Gendler. ELEMENTS OF TELEVISION SERVICING. Prentice Hall, 1963.

3. Buban, Peter & Marshall Schmitt. TECHNICAL ELECTRICITY AND ELECTRONICS. McGraw-Hill, 1972.

4. Middleton, Robert. AM-FM-TV ALIGNMENT. Howard Sons, 1970.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is potential danger inherent in electrical devices and in their use.	1. Safety -unsafe acts -unsafe conditions	The student will learn: a. how to assess a work-station for safety. b. the safety rules that apply to servicing electronic equipment.	The student will: a. given any assignment, not attempt the trial and error method of inquiry. b. practice safe procedures on all assignments.
2. Most complicated electronic devices are made up of a number of basic circuits working together.	2. The Television System	a. the definition of television.	a. draw and explain briefly a block diagram of a typical television set: - black and white receiver - black and white transmitter - black and white camera.
3. Energy can pass through various mediums	3. Energy Transmission	a. the elements of - transmission of a signal - reception of a signal.	a. Compare the radio receiver with the television receiver and list the similarities.
4. Energy must be controlled to make it more useful.	4. Energy Control	a. to read block diagrams of the T.V. camera. - black and white - color, and T.V. receiver - black and white - color. b. the composite video signal.	a. using an oscilloscope, observe and explain the video signal.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
5. Accurate measurement is essential for determining the functioning standards of a television.	5. Measurement Instruments	The student will learn: a. how to use the measuring instruments -oscilloscope -signal generator -meters.	The student will: a. locate the basic components in a television receiver from a schematic diagram.
	Schematics	b. how to read symbols/ schematics.	
6. A logical system for diagnosis is important to the repair man.	6. Trouble Shooting	a. to identify common faults -adjusting controls -location of sections -synchronization of sections -picture tube -others.	a. locate and explain common problems in a T.V. receiver and identify the problem using a schematic drawing. b. explain the difference between a closed circuit television system (C.C.T.V.) and a broadcast television system.
7. Energy can be converted from one form to another.	7. Energy Conversion	a. about -modulation -T.V. cameras and receivers -radar -laser.	a. demonstrate an understanding of how speech, music, waves, light and pictures can be transmitted from one location to another.
8. Schools must help students make realistic career choices.	8. Occupations	a. to use the Canadian classification and Dictionary of Occupations.	a. list potential career areas in the field of television. b. research an occupational area to discover training needed, educational requirements, where training available, job security, etc.

* Common concepts in *script*. These are concepts common to most units.

ELECTRICITY - ELECTRONICS

LOGIC

MODULE NINE

MODULE NINE

LOGIC

INTRODUCTION

This module introduces the students to the basic concepts of digital electronics and advances them to the more sophisticated circuits through hands-on experiences.

I. OBJECTIVES

The objectives of this module in logics are to:

1. Give the students the opportunity to study digital logic applications,
2. Give the students hands-on experiences with computer circuitry.

II. REFERENCES

1. Rony and Larsen. BUG BOOK I, II, and III. E. and L. Instruments Inc., 61 First Street, Derlez, Connecticut, 06418.
2. BYTE. Gree Publishing Inc.
3. Texas Instruments and Learning Centre. UNDERSTANDING SOLID STATE . Radio Shack.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.	1. Safety -unsafe acts -unsafe conditions	The student will learn: a. how to check the work area for unsafe conditions. b. learn the proper safety procedures for handling electronic equipment and test instruments.	The student will: a. perform all work activities, following safe procedures and not attempting a trial and error method of inquiry.
2. Number systems vary and some are more suited to computer use.	2. Number Systems	a. about number systems used -decimal -binary -octal -hexadecimal. b. Boolean algebra	a. convert decimal to binary to octal to binary numbering systems. b. given instruction, express the logical operations of AND, OR, and not in the Boolean symbolic notation.
3. Energy can be utilized through the mechanism of a computer to solve complicated problems.	3. Energy utilization * *Graphic Interpretation.*	a. basic digital logic b. about gates -truth tables -"bits".	a. explain the operation of an AND and OR gate. b. express the gates in symbolic and Boolean symbolic notation along with the necessary truth tables.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
4. Energy can pass through different mediums.	4. Energy Transmission	The student will learn: a. how to do coded conversion and decoding.	The student will: a. given the equipment, use electronic circuitry (I.C.S.) for decoding gated chips.
5. Energy must be controlled to make it more useful.	5. Energy Control	a. about memories, I.C.S., peritheral equipment.	a. construct various gated chips to proof truth tables. b. use peritheral equipment where appropriate. c. use test instruments to identify the various pulses found in logic circuitry.
	*Consumer awareness	a. how to use reference materials such as -cross-references -data books -supplies specifications -product catalogues.	a. find a logic pattern used by manufacturers in coding components. b. order components for a project or repair.
	*Technical Implications	a. about micro processors.	a. discuss the influence that new advances of digital electronics play in the way we live. b. write a precis on how information on individuals is assembled and stored.

ELECTRICITY - ELECTRONICS

COMPUTER

MODULE TEN

MODULE TEN

COMPUTER

INTRODUCTION

This module on computer builds on the content of Module Nine and advances the students to computer organization, operation and programming. Logic, Module Nine, is not a mandatory pre-requisite but would be beneficial.

I. OBJECTIVES

The objectives of this module in computer are to:

1. Give students an insight into how a computer works.
2. Give students practical experiences in programming a computer to solve problems.

II. REFERENCES

1. Byte. Green Publishing.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. Any form of energy can be converted into another form.	1. Energy Conversion * *Graphic Interpretation*	The student will learn: a. about and understand the data processing system concepts -system organ- -ization -input/output, -units -sorting -coning -flowchart. -symbology -analysis. b. about storage systems -representation of data -systems (coding) -storage -primary -auxiliary.	The student will: a. correctly use data processing terms in conformity with their definition when discussing data systems. b. do a system analysis (block diagram) and explain the characteristics of each block. c. translate Hollerith, B.C.D. and binary codes.
2. Energy can pass through different mediums.	2. Energy Transmission	a. about output buffering -tape -disk -C.R.T.	a. construct and interpret a basic flow chart.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
		The student will learn:	The student will:
		b. how to do data flow/ programming - basic concepts - single address system - data flow	b. write a program solving a data processing problem using symbolic language.
		c. the meaning of interative programming - conditional - branching instructions. - unconditional - branching instructions. - address modifications.	c. execute a working program in a computer.
	* Societal Implications		a. forecast the cost, benefit and consequences of the use of computers.
3. Energy must be controlled to make it more useful.	3. Energy Control. * Consumer Awareness.	a. how to do a systems check - computer console - uses and displays - automatic checks - programming checks.	

ELECTRICITY - ELECTRONICS

ELECTRIC WIRING

MODULE ELEVEN

MODULE ELEVEN

ELECTRIC WIRING

INTRODUCTION

Through the study and activities of this module, the students will become familiar with the electrical circuits found in a normal residence and understand how these are controlled.

I. OBJECTIVES

The objectives of this module is electric wiring are to:

1. Give the students experiences in the practical application of electrical circuitry and safety regulations,

2. Give the students practice in the proper way to terminate leads, install switches and other electrical devices found in the home.

II. REFERENCES.

1. Canadian Electrical Code

2. Clidero, R.K. & K.H. Sharpe. APPLICATIONS OF ELECTRICAL CONSTRUCTION, General Publishing.

3. Graham, Kennard C. INTERIOR ELECTRIC WIRING, RESIDENTIAL 6th ed. American Technical Society, Chicago 1974.

III. SAFETY

The teacher should make the students aware of the importance of good electrical-mechanical connections, the use of properly related components, limits of protection devices and personal safety.

TOPIC - ELECTRIC WIRING

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is potential danger inherent in the installation of electrical devices.	1. Safety	The student will learn: a. the importance of adhering to the "Canadian Electrical Code" as one makes electrical installations.	The student will: a. properly and safely install boxes, protection devices, switching devices, receptacles, lighting devices, conductors and grounds.
2. Energy can be converted into other forms	2. Energy Conversion	a. how to convert at least three forms of energy into electrical energy - heat - light - chemical.	a. given the appropriate devices, experiment with converting other forms of energy to electrical energy.
3. Energy must be controlled to make it more useful.	3. Control	a. the terms used in the measurement and control of electricity - volt - resistance - ampere - watt.	a. compute the demand of a typical garage or house. b. set up a circuit to control a device or load from 1, 2 or 3 different locations.
4. Energy can pass these different kinds of mediums.	4. Transmission *Technological Implications.	a. why copper is a common conductor. b. about the implications of using copper over other metals such as aluminum.	a. wire basic electric circuits. b. make proper termination installations using copper and aluminum wire and note the advantages and disadvantages of each.

* Common concepts in *script*. These are concepts common to most units.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
5. Electricity is one of of the most commonly used forms of energy.	5. Energy Utilization	The student will learn:	The student will:
		a. how to interpret electrical drawings for -branch circuits -demand factors -control and protection -predictability for installation -estimating.	a. compile a list of electrical devices used in his home along with their rated wattage. b. draw a wiring diagram for one circuit in a garage and then wire it on a mock-up.
	* Consumer Awareness	a. the importance of getting a permit to instal' wiring. b. how to do comparative shopping.	a. go through the procedure in obtaining a permit to wire a rumpus room or garage.
	* Occupational Information.	a. how and where to get information on the electrical trade. b. how to use the Canadian Classification and Dictionary of Occupations. c. the difference between kinds of electricians -residential -commercial -industrial.	a. list the qualifications and education necessary to become an electrician. b. identify school courses that will help prepare for the electrician trade.

ELECTRICITY - ELECTRONICS

DESIGN AND CONSTRUCTION

MODULE TWELVE

MODULE TWELVE

DESIGN AND CONSTRUCTION

INTRODUCTION

This module will give the students the opportunity to study the importance of planning, organization and quality control as they assemble their own project from their own layout.

I. OBJECTIVES

The objectives of this module in design and construction are to:

1. Give the students the opportunity to design a project using the theory they have learned, and

2. Give students the opportunity to construct the project of their own design.

II. REFERENCES

1. Magazines: Popular Electronics
   Elementary Electronics

2. Buban, Peter & Marshall L. Schmitt. TECHNICAL ELECTRICITY AND ELECTRONICS. McGraw-Hill,1972.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
1. There is a potential danger inherent in electrical devices and in their application.	1. Safety	The student will learn: a. how to identify unsafe acts and condions. b. the difference between trial and error and planned inquiry. c. to read the specifications on a device and assess the potential danger (C.S.A. approval voltage, amperage wattage, voltamps, model, serial number.)	The student will: a. list the safety factors to be considered in the development of the project. b. locate the manufacturers plate and explain the specifications found on it
2. Energy is used by even the simplest of working devices.	2. Energy Utilization *Measurement	a. to use test instruments to measure energy consumption - V.O.M. - V.T.V.M. - power supply - oscilloscope.	a. justify his/her project by stating its practical use.
	*Technical Implications	a. about - work schedules - production flow charts - identifying problem areas	a. given guidelines and examples -design or select a project -make a drawing -make a parts list -price the items.

* Common concepts in *script*. These are concepts common to most units.

TOPIC DESIGN AND CONSTRUCTION

D and C.

GENERALIZATIONS	TECHNICAL AND *COMMON CONCEPTS	LEARNING TASKS	BEHAVIOURAL OBJECTIVES
		The student will learn: -availability of parts -assembly techniques -necessary skill -use of tools. iv. component identification -symbols -schematics. v. how to design P.C. boards.	The student will: b. Construct the planned project -pre-test and record data on components -assemble a prototype from the schematic -locate critical parts and record pertinent data -list and identify -energy converters -control devices -type of energy transmission. -design an acceptable printed circuit board for the project -assemble the project -critically analyze tne assembled project.
3. Any form of energy can be converted.	3. Energy Converters		
4. For energy to be useful we must be able to control it.	4. Energy Control.		
5. Electricity can pass through many mediums.	5. Energy Transmission		

1. Research Module

The purpose of the Research Module is to allow individual students to engage in an in-depth study of a problem related to any of the career fields.

The time period is 25 hours and qualifies as a regular module.

The module provides for individualizing the program to allow for special interests of students. The student should prepare a proposal of his research and have it approved by the teacher. The proposal should contain:

a) A statement of the problem.
b) The procedure to be followed in the research of the problem.
c) A list of the materials and lab facilities to be used.
d) A time line of activities.

2. Developmental Module

The purpose of the Developmental Module is to provide a 25-hour block of time for the teacher to try out new content with his class. The content of the proposal or project should be discussed with the Associate Director of Curriculum for Industrial Education.

3. Production Service Module

The purpose of Production Service is to provide for a class project in setting up a company to produce a product or service.

The production Science 30 course will provide an outline from which content may be slected to develop a 25-hour module. The Production Science 30 is a full 4-5 credit course so the teacher must be selective in choosing the content for a 25-hour or one-credit module.

CURRICULUM GUIDE